

Agriscience

Agriscience consists of standards to prepare students for biology and subsequent sciences for the university bound student. The content area covers ecology, biological processes, sexual and asexual reproduction and a study of the chemical and physical laws that govern life. This course helps students understand the important role science serves as the agricultural industry moves into the 21st century.

Pre-requisite: None

Recommended Credit: 1

Recommended Grade Level: 9th

Note: It was the consensus of both the industry representatives and the teachers that a student who receives credit in Agriscience should not be awarded credit in Fundamentals of Agriculture and a student who receives credit in Fundamentals of Agriculture should not be awarded credit in Agriscience.

***** All learning expectations must be met for the 1 credit in this course.

Agriscience

Standard 1.0

The student will evaluate the use of the scientific method to supply the world with needed agricultural products.

Standard 2.0

The student will determine the importance of wildlife populations and environmental conditions in our natural habitats.

Standard 3.0

The student will explain the functions of cell structure, genetic activity and reproductive organs of animals and diagram their components.

Standard 4.0

The student will examine the functions and chemical reactions that allow digestion to occur in animals.

Standard 5.0

The student will evaluate plants by use, purpose and position within the scientific classification system.

Standard 6.0

The student will analyze cell structure, genetics and reproduction of plants.

Standard 7.0

The student will evaluate different methods by which electrical energy can be produced and used.

Standard 8.0

The student will integrate academic competencies into agriscience.

Standard 9.0

The student will develop premier leadership and personal growth needed in the area of agriscience.

Agriscience

Course Description:

Agriscience consists of standards to prepare all students for biology and subsequent sciences for university or technical paths. The content area covers ecology, biological processes, sexual and asexual reproduction and a study of the chemical and physical laws that govern life. This course helps students understand the important role science serves as the agricultural industry moves into the 21st century.

Standard 1.0

The student will evaluate the use of the scientific method to supply the world with needed agricultural products.

Learning Expectations:

The student will:

- 1.1 Summarize terms that relate agriculture and science.
- 1.2 Determine why agriculture is important to Tennessee's economy.
- 1.3 Describe events that have influenced agriscience education.
- 1.4 Evaluate career opportunities in agriscience and agriculture.
- 1.5 Specify the steps of the scientific method.
- 1.6 Analyze the desired effect of leadership on world agriculture production.
- 1.7 Prepare an outline for and make a presentation on an agricultural science project.
- 1.8 Determine the benefits of conducting an SAEP, supervised agricultural experience program, as it relates to science.
- 1.9 Explain the function of competition in science-related projects in the learning process.
- 1.10 Describe the impact of technological developments on agriculture and their effect on the lifestyle of society.

Evidence Standard is Met:

The student will:

- Analyze statistical data regarding the economic importance of agriculture in Tennessee and the nation.
- Describe the development of agricultural education and its importance today.
- Apply the scientific method to challenges facing agricultural production today.
- Examine the effects of advanced technology on food production and quality.
- Develop a presentation on agricultural advancements in science.

Integration/Linkages

Mathematics, Biology, Physical Science, Language Arts, Humanities, National FFA Standards, SCANS (Secretary's Commission on Achieving Necessary Skills)

Sample Performance Tasks

- Present a portfolio of careers available in agriscience and agriculture.
- Develop a group presentation on technological and scientific advances in agriculture.
- Present a two-to-four minute speech on the importance of science in agriculture.
- Describe skills and activities required for successful production of food and fiber.

Standard 2.0

The student will determine the importance of wildlife populations and environmental condition in our natural habitats.

Learning Expectations:

The student will:

- 2.1 Summarize terms associated with ecology and conservation.
- 2.2 Analyze the major components of a food chain in nature.
- 2.3 Analyze the main parts of the water cycle.
- 2.4 Examine the main flow of carbon dioxide and oxygen between plants and animals.
- 2.5 Diagram the parts of the nitrogen cycle.
- 2.6 Examine the factors that affect population growth and survival of the fittest.
- 2.7 Evaluate integrated pest management techniques.
- 2.8 Distinguish types of pollution and their sources.
- 2.9 Describe the theorized greenhouse effect caused by the Earth's atmosphere.
- 2.10 Compare conservation agencies and organizations.

Evidence Standard is Met:

The student will:

- Summarize the importance of various life cycles to the environment.
- Evaluate the effect of humanity on ecosystems and the environment.
- Present visual representation of the food chain.
- Appraise the chemical activity involved in the flow of carbon dioxide and oxygen between plants and animals.
- Describe the natural events that take place in integrated pest management of insects and other harmful pests.

Integration/Linkages

Mathematics, Biology, Physical Science, Language Arts, Humanities, National FFA Standards, SCANS (Secretary's Commission on Achieving Necessary Skills), Biotechnology Standards

Sample Performance Tasks

- Engage in a group activity in which students work as a team to survive using the natural resources they find in the community.
- Create insect models and write an integrated pest management plan to control the insect they choose.
- Construct a terrarium and record the observable water cycle events.
- Develop a portfolio of evidences of the various environmental cycles that occur.

Standard 3.0

The student will explain the functions of cell structure, genetic activity and reproductive organs of animals and diagram their components.

Learning Expectations:

The student will:

- 3.1 Examine the parts of the cell and their functions.
- 3.2 Analyze the role of genes in determining hereditary characteristics.
- 3.3 Describe the procedure determining the genetic makeup and the sex of animal offspring.
- 3.4 Distinguish between performance testing and progeny testing.
- 3.5 Analyze different types of performance records.
- 3.6 Evaluate different systems of breeding livestock.
- 3.7 Diagram parts of an animal's reproductive tract.
- 3.8 Explain the fertilization process in animals.
- 3.9 Compare the advantages and disadvantages of alternative breeding methods.
- 3.10 Describe the signs of estrus.
- 3.11 Determine the factors that inhibit conception.

Evidence Standard is Met:

The student will:

- Differentiate the parts and functions of an animal cell.
- Analyze the exhibition of traits by animals and their inheritance by offspring.
- Compare appearance and performance testing.
- Diagram the reproductive tracts of a cow and bull.
- Summarize factors that encourage or inhibit an animal's ability to reproduce.

Integration/Linkages

Mathematics, Biology, Physical Science, Language Arts, Humanities, National FFA Standards, SCANS (Secretary's Commission on Achieving Necessary Skills), Biotechnology

Sample Performance Tasks

- Sketch the reproductive tracts of both sexes.
- Explain the chemical makeup of hormones within the animal's body and the physiological effect of hormones on the body.
- Develop a presentation on the importance of the different parts of the reproductive system.
- Using the Internet, present research on new breeding techniques and methods.
- Diagram the parts of an animal cell and describe their functions.

Standard 4.0

The student will examine the functions and chemical reactions that allow digestion to occur in animals.

Learning Expectations:

The student will:

- 4.1 Summarize terms associated with livestock nutrition.
- 4.2 Briefly describe types of digestive systems found in domestic livestock.
- 4.3 Classify domestic animals based on their digestive systems.
- 4.4 Evaluate the various stages within the digestive process.
- 4.5 Discuss terms associated with metabolism in animals.
- 4.6 Differentiate types of performance rations.
- 4.7 Describe nutrient requirements and the functions of each.

Evidence Standard is Met:

The student will:

- Interpret terms related to livestock nutrition.
- Determine the nutritional needs of an animal, based on its digestive system and use.
- Describe the functions of the parts of an animal's digestive system.
- Explain why different feeds provide different nutritional needs for an animal.
- Examine the basic livestock feed-stuffs.

Integration/Linkages

Mathematics, Biology, Physical Science, Language Arts, Humanities, National FFA Standards, SCANS (Secretary's Commission on Achieving Necessary Skills)

Sample Performance Tasks

- Balance rations using the Pearson Square Method.
- Diagram the compartments of the livestock digestive system.
- Distinguish the differences in the digestive systems of different livestock animals.
- Recommend different animal feed materials.
- Develop a presentation on the chemical reactions that occur during the digestive process.

Standard 5.0

The student will evaluate plants by use, purpose and position within the scientific classification system.

Learning Expectations:

The student will:

- 5.1 Summarize the terms associated with plant and soil chemistry.
- 5.2 Diagram the parts of an atom.
- 5.3 Evaluate the atomic chart.
- 5.4 Compare ionic bonding and covalent bonding.
- 5.5 Distinguish between elements, compounds and mixtures.
- 5.6 Compare properties of acids, bases and salts.
- 5.7 Diagram the parts of a molecular equation.
- 5.8 Recommend soil types suited for crop production in Tennessee.
- 5.9 Relate crops to the correct pH.
- 5.10 Recommend elements needed by plants.
- 5.11 Analyze symbols of elements needed for plant growth.
- 5.12 Specify nutrient deficiencies in plants.
- 5.13 Determine components of the Tennessee Liming Materials Law.

Evidence Standard is Met:

The student will:

- Compare terms related with plant and soil chemistry.
- Formulate equations, using molecular formulas.
- Sketch models of various atoms and their atomic structure.
- Question the differences between ionic and covalent bonding.
- Differentiate between elements, compounds and mixtures.

- Differentiate between acids, bases and salts.
- Relate soil type and pH to crops grown in Tennessee.
- Compare nutrients needed in plants to plant deficiencies.

Integration/Linkages

Mathematics, Biology, Physical Science, Language Arts, Humanities, National FFA Standards, SCANS (Secretary's Commission on Achieving Necessary Skills)

Sample Performance Tasks

- Evaluate the nature of different chemical elements and their reactions.
- Balance chemical equations.
- Sketch the periodic chart.
- Construct a model of an atom's structure.
- Evaluate the effects of different nutrients on plants.
- Compare the differences between elements, compounds and mixtures.
- Compare the differences between acids, bases and salts.

Standard 6.0

The student will analyze cell structure, genetics and reproduction of plants.

Learning Expectations:

The student will:

- 6.1 Summarize terms related to cell structure and genetics.
- 6.2 Diagram the parts and functions of plant cells.
- 6.3 Summarize terms related to plant processes.
- 6.4 Balance the parts of chemical equations related to plant processes.
- 6.5 Examine the importance of the cohesion theory.
- 6.6 Examine the effects of different colors of light on plant growth.
- 6.7 Diagram seed parts and factors that affect seed germination.
- 6.8 Discuss the effects of herbicides on plants.
- 6.9 Distinguish between sexual and asexual reproduction.
- 6.10 Diagram parts of the flower and give the function of each part.

Evidence Standard is Met:

The student will:

- Describe how the principles of plant science are used in a greenhouse environment.
- Analyze the functions of plant growth and reproduction.
- Examine plant cell structure.
- Illustrate plant parts and their functions.
- Illustrate the parts of a seed and their functions.
- Differentiate between various herbicides and their effects.
- Distinguish between the various plant processes and their functions and chemical functions.
- Illustrate the effects of colors of light on plant growth.
- Examine the parts of a flower and discuss the function of each part.

Integration/Linkages

Mathematics, Biology, Botany, Physical Science, Language Arts, Humanities, National FFA Standards, SCANS (Secretary's Commission on Achieving Necessary Skills)

Sample Performance Tasks

- Create a portfolio of the different leaf shapes.
- Sketch a drawing of the parts of a plant.
- Give a presentation on the value of plants, chemical derivatives and medicinal uses.
- Collect specimens of different leaves, giving the common and scientific names.
- Examine plant growth based on different environmental factors.
- Examine the effect of chemical actions of plant processes on plant growth.

Standard 7.0

The student will evaluate different methods by which electrical energy can be produced and used.

Learning Expectations:

The student will:

- 7.1 Summarize terminology relative to power and energy.
- 7.2 Analyze the relationship between speed, distance and time.
- 7.3 Relate principles of physics to procedures for measuring work, power and horsepower.
- 7.4 Specify groups, sources and forms of energy.
- 7.5 Describe the law of conservation and energy.
- 7.6 Relate the types of simple machines to the law of machines and mechanical advantages.
- 7.7 Analyze the principle of heat energy and describe the way heat travels.
- 7.8 Examine the electron theory of electricity.
- 7.9 Determine voltage, amperage, resistance and wattage utilizing the appropriate instruments.
- 7.10 Relate physics concepts to agriscience applications.
- 7.11 Differentiate between the types of engines.
- 7.12 Explain the production of energy and relate it to the invisible light spectrum.
- 7.13 Describe the function of the major parts of the gasoline and diesel fuel systems.
- 7.14 Compute horsepower.
- 7.15 Calculate mechanical and thermal efficiency in internal combustion engines.
- 7.16 Specify the basic applications of thermodynamics.
- 7.17 Prescribe safe practices for handling electrical power supplies.

Evidence Standard is Met:

The student will:

- Recommend methods for safely using elements to produce power.
- Demonstrate how energy is produced naturally.
- Explain how an internal combustion engine converts fossil fuels into usable energy.
- Demonstrate how physical laws govern life on Earth.
- Evaluate the efficiency of machines in a working environment.

Integration/Linkages

Mathematics, Physics, Physical Science, Language Arts, Humanities, National FFA Standards, SCANS (Secretary's Commission on Achieving Necessary Skills)

Sample Performance Tasks

- Demonstrate that the Earth's surface possesses natural power, through the use of magnets.
- Demonstrate the principles of mechanical energy through the use of moving water.
- Demonstrate how heat energy can be achieved through the use of friction.

Standard 8.0

Student will integrate academic competencies into agriscience.

Language Arts

The student will:

- 8.1 Write a grammatically correct speech on the importance of science in agriculture.
- 8.2 Browse and select research materials on biotechnology from the Internet.
- 8.3 Write a report based on the research involving science and biotechnology in agriculture.

Mathematics:

The student will:

- 8.4 Properly use devices for measuring energy, heat and horsepower.
- 8.5 Perform equations related to plant processes.
- 8.6 Perform conversions from the Metric to the English system for plant nutrient needs.

Science:

The student will:

- 8.7 Diagram plant parts.
- 8.8 Classify groups of plants based on their taxonomy.
- 8.9 Diagram body parts of animals.
- 8.10 Differentiate organ systems of one or more animals and give their functions.
- 8.11 Balance chemical equations related to plant processes.
- 8.12 Determine the effect animals have on local ecology.

- 8.13 Evaluate types of pollution found in the local community.
- 8.14 Determine how ions affect soil fertility.
- 8.15 Compare ways different types of bonding affect soil chemistry.
- 8.16 Diagram elements from periodic table.
- 8.17 Determine the effects of agricultural pollution on the environment.

Evidence Standard is Met

The student will:

- Present either an oral or a written report on the importance of science in agriculture.
- Calculate horsepower, speed, and energy loss.
- Determine the use of anions and cations in soil fertility.
- Evaluate the importance of the parts of a plant to plant growth.
- Evaluate the importance of various organs to animal health.
- Determine the effects that animals and humans have on the environment.

Integration/Linkages

Mathematics, Biology, Physical Science, Language Arts, Humanities, National FFA Standards, SCANS (Secretary's Commission on Achieving Necessary Skills)

Sample Performance Tasks

- Present a speech relating agriculture and science.
- Balance chemical equations related to plant processes.
- Dissect a seed.
- Test local water supplies for contaminants.
- Test a soil sample for nutrient deficiencies.

Standard 9.0

The student will develop premier leadership and personal growth needed in the area of agriscience.

Learning Expectations:

The student will:

- 9.1 Demonstrate a positive work ethic and attitude.
- 9.2 Demonstrate proper time management skills.
- 9.3 Apply problem-solving skills.
- 9.4 Describe career plans that develop critical life-long thinking skills and allow for life long learning.
- 9.5 Demonstrate the ability to conduct a meeting in accordance with Robert's Rules of Order.

Evidence Standard is Met:

The student will:

- Prescribe the positive work ethics and attitudes needed in business.
- Demonstrate how proper planning can not only save on time, but also aid in solving problems.
- Develop a five-year plan for career goals, based on an SAEP, supervised agricultural experience program..
- Present oral reports related to the importance of agriculture in our society.

Integration / Linkages

Language Arts, Humanities, National FFA Guidelines for the Creed CDE, career development event, SCANS (Secretary's Commission on Achieving Necessary Skills), National FFA Guidelines for SAEP.

Sample Performance Task

- Recite FFA Creed.
- Conduct a mock business meeting, using three parliamentary procedure abilities.
- Deliver a two-to-three-minute presentation on the importance of leadership in agriculture.
- Prepare a five-year plan of action to reach personal goals.
- Develop an SAEP and complete appropriate record books.